

## SANANGO: NEW AMAZONIAN GENUS OF LOGANIACEAE

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### ABSTRACT

The new genus, *Sanango*, shows affinity to the genera *Buddleja*, *Nuxia* and *Peltanthera*, of the Loganiaceae, though the five-lobed corolla with only four stamens is more characteristic of other families, such as the Scrophulariaceae. Various features of *Sanango durum* are discussed and illustrated. GEORGE S. BUNTING, L. H. Bailey Hortorium, Cornell University, Ithaca, New York; JAMES A. DUKE, Missouri Botanical Garden, 2315 Tower Grove Ave., St. Louis 10, Missouri.

Among recent collections of Felix Woytkowski from Amazonian Peru is a specimen of a plant that appears to be intermediate between the families Loganiaceae and Scrophulariaceae! It is a fine example of the situation which has led to the widespread view that the Loganiaceae are an artificial group constituted primarily of genera excluded for one reason or another from other well-marked, natural families. There is still ample cause to argue this case, for there is no obvious "family resemblance" to guide us, and often the circumscription of the family is inadequate to positively include or exclude an unknown plant.

A century ago George Bentham (Jour. Linn. Soc. Bot. 1:52-114. 1854) wrote: "There can be no doubt that Rubiaceae, Apocynae, Gentianeae, and Scrophularineae are large independent orders indicated in nature, yet those genera now amalgamated under the name of Loganiaceae bind them so firmly together, that some of these genera will be found even more closely allied to certain others of each of the above orders respectively than they are to each other." And he continues: "The Loganiaceae lie very near to some part or other of the vast family of Rubiaceae, but by their free ovary, they are absolutely, and by very few exceptions, clearly separated. The connecting genera with the Apocynae, Gentianeae, and Scrophularineae are on the other hand, much fewer, but their union is much closer. With Scrophularineae in particular, although the general affinity is more remote, the few intermediate genera and species are intermediate in every respect, in habit as in technical characters. The main distinction, the presence of stipules in Loganiaceae, disappears very gradually, and the difficulty of drawing the line is the greater from there being no habit or family resemblance to unite the several members of the Loganiaceae."

It is in this paper that Bentham discussed the similarity of the genus *Buddleja* (previously included in Scrophulariaceae) to *Logania*, and concluded the necessity to place them together, along with the genus *Polyprenum*, in the family Loganiaceae.

Now we have discovered another plant that seems to stand nearly between the Loganiaceae and Scrophulariaceae. The fruiting specimen has a distinct aspect of *Buddleja*, but several technical features prevent its inclusion in that genus. It is equally, if remotely, allied to the genus *Peltanthera*. After thorough study of this plant, and consultation with N. Y. Sandwith at Kew, and J. J. Wurdack at Washington, we are convinced that it represents an unnamed genus, and describe it as new.

**Sanango Bunting et Duke, gen. nov.**

Arbores parvae ligno valde duro, foliis oppositis petiolatis binis lineis conjunctis. Flores in thyrsis bracteolatis, calyce ad medium lobato, segmentis lanceolatis subaequalibus, corolla 5-lobata,  $\pm$  hypocrateriformi, gibbosa, segmentis rotundatis subaequalibus, aestivatione cochleari, staminibus 4 (!) sub sinibus prope tubi basim affixis, filamentis inflatis, antheris subrotundis singulatim 2-theclas ferentibus, introrsis versatilibus in linea  $\pm$  hippocrepiformi aperientibus, staminodio parvulo, ovario globoso leviter 4-lobato biloculari disco cupuliformi circumdato placentis axillaribus multiovulatis, stylo brevissimo, stigmate capitato bilobato. Capsula polysperma septicidalis, utroque carpello iterum scisso.

**Sanango durum Bunting et Duke, sp. nov.**

Arbor 16 m. alta ramulis lenticellatis. Foliorum lamina 10–25 cm. longa 4–7 cm. lata elliptica vel anguste obovata ad apicem acuminata, ad basim cuneata vel attenuata, parce et inaequaliter denticulata praecipue in dimidio superiore, venis lateralibus utrinque 5–7 arcuatis ascendentibus, infra pallida venis strigulosis instructa; petiolus 0.5–1.0 cm. longus, ad basim latus, facie adaxiali velutina ferruginea. Inflorescentia 5–12 cm. longa terminalis vel axillaris  $\pm$  secunda, pedunculo et pedicellis strigulosis, pedicello ca. 1 mm. longo; florum calyces ca. 3.5 mm. longi puberuli lobis 5 acutis 1.5–2 mm. longis; corollae albae aliquantum carnosae, ca. 1.2 cm. longae extus puberulae et glanduloso-puberulae, intus glanduloso-puberulae et etiam pilosae in tubi basi, lobis ca. 3–4 mm. longis; filamentorum staminalium partes liberae pilulosae vix 2.5 mm. longae antheris ca. 0.5 mm. latis brevioribus quam latis; staminodium parvulum vix 0.2 mm. longum; ovarium globosum ca. 1 mm. longum, disco cupuliformi tam procero atque ovario; stylus crassus persistens, una cum stigmate magno ca. 1 mm. longus. Capsula ellipsoidea vel anguste obovoidea ca. 3.5–4.0 mm. lata parietibus osseis; semina orthotropa  $\pm$  elongata fusiformia ca. 0.7 mm. longa recta vel sigmoidea.

Type collection: *Felix Woytkowski 5619*, "tree 12 m. tall; no latex; flowers white; in forest, elev. 300 m.; Aramango, s. of Nazaret," depto. Amazonas, Peru; 2 April 1960 (HOLOTYPE MO, isotype K, US).

Distribution: Forests between 300 and 750 m. elevation, west central Amazonas and central Junín, Peru. These localities are separated by nearly 500 air miles. It seems plausible that the distribution may be more or less continuous between these points.

PERU: Junín: Satipo, Aug. 1960, *Woytkowski 5925* (MO).

Vernacular name: "Sanango" (Amazonas).

The generic name *Sanango* is the colloquial name furnished by the collector of this plant. It is a corruption of a Quechuan word, "sanangu", an Indian word applied also to species of *Tabernaemontana*, *Rauwolfia*, and *Malpighia*. The specific epithet refers to the hard wood to which Woytkowski called attention in his field notes. Untreated, the wood disfigures a razor blade when one attempts to cut a hand section.

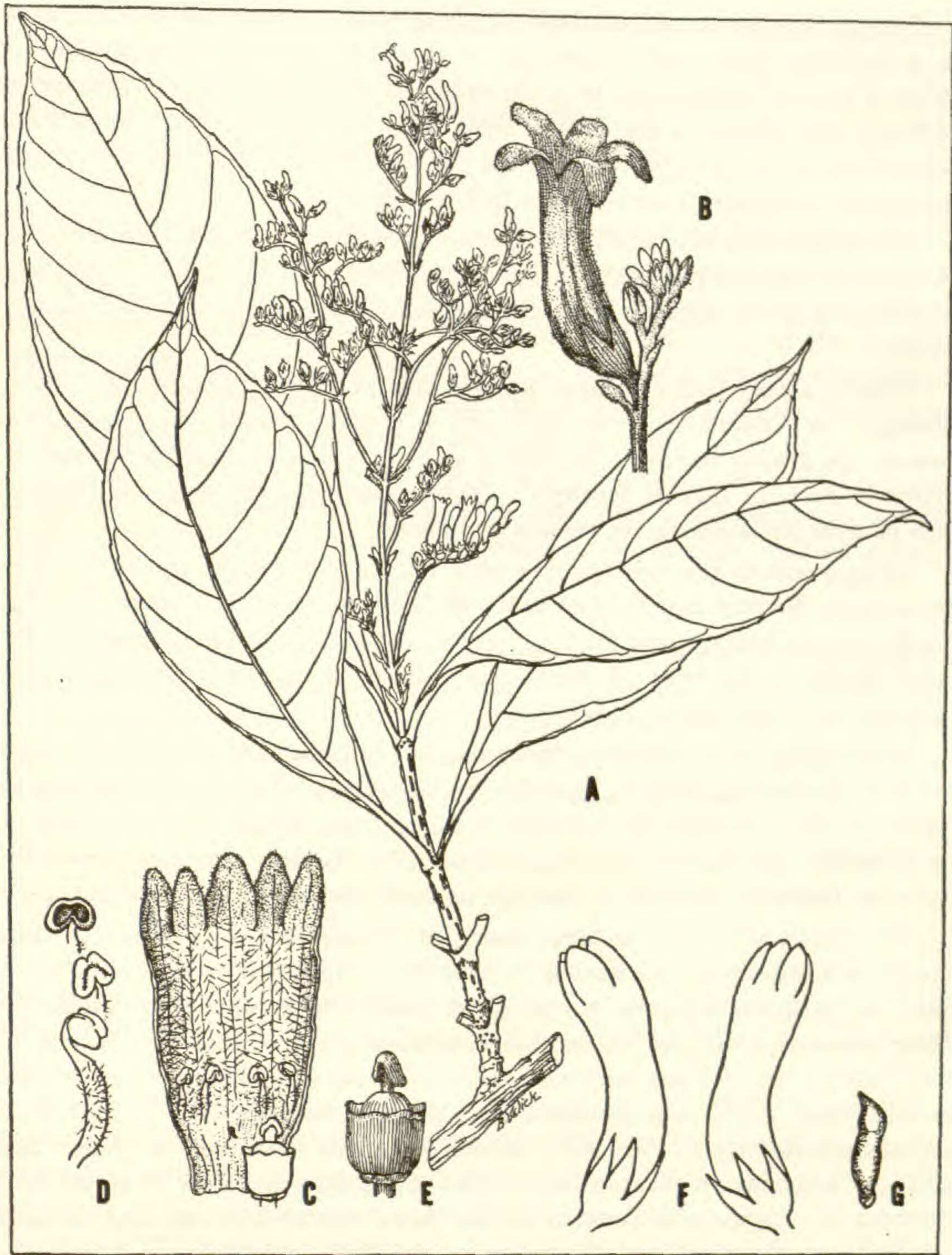


Figure 1. *Sanango durum* Bunting & Duke. a. flowering branch b. flower c. flower with corolla cut open d. stamen from young flower bud, with adaxial view of young anther (center) and anther after dehiscence (top) e. enlargement of pistil, ovary nearly covered by cup-like disk f. diagrams of a single flower bud from opposite sides illustrating aestivation. g. seed

*Sanango* belongs to the subfamily Buddlejoidae. Its nearest relatives appear to be *Buddleja*, *Nuxia*, and *Peltanthera*. It should be noted that *Sanango* has been collected only in localities that lie in the middle of the known range of *Peltanthera*.<sup>1</sup> Although the affinity is not strong, these latter two genera share the following characteristics: hippocrepiform dehiscence of the anthers, a disk between the ovary and corolla, multicellular hairs, and a lack of stipules.

The combination of characters occurring in *Sanango* is unusual in Loganiaceae, but most of them occur singly in some other genus of the family. The hippocrepiform mode of dehiscence of the stamens occurs also in the African genus *Nuxia*.

There is a very well developed annular disk of firm texture in the flower of *Sanango*. In *Peltanthera*, a very short disk is present, conspicuous only in young flowers. In *Nuxia*, however, the disk is annular, and though membranous, very similar in form to that in *Sanango*.<sup>2</sup> Notwithstanding, the style and stigma of each of these three genera are extremely different.

An approach to the *Sanango*-type pistil occurs in *Buddleja*, and in the herbaceous genera *Mitreola* and *Polypreum*. In *Mitreola*, the style is short, the stigma smaller than in *Sanango*, and the ovary splits in two at the top as it develops. Even more similar is the fruit of *Polypreum* which splits into four segments at maturity as it does also in *Buddleja*.

Multicellular hairs similar to the dendroid or branched type in *Peltanthera* have not been observed in *Sanango*, nor have we encountered the glandular, peltate type similar to those described by Solereder (Pflanzenfam. 4<sup>(2)</sup>:23, fig. 12. 1892) and by Hunziker and Fulvio (op. cit. in footnote). Certain types of multicellular hairs are, however, common in *Sanango* on both vegetative and floral parts.

The corolla is 5-lobed in some genera of Loganiaceae and 4-lobed in others. Indeed both conditions are known to exist in a single species of *Buddleja*. The loganiaceous flower typically has an equal number of stamens and corolla lobes. *Sanango* is unique<sup>3</sup> in the Loganiaceae in possessing a five-lobed corolla with only four stamens, the fifth one merely suggested by a very small appendage not apparent in all flowers. This characteristic is typical of such families as Verbenaceae and Scrophulariaceae. We feel, nonetheless, that *Sanango* is more closely allied to Loganiaceae than to any other. Such an opinion is dictated by the presence of a stipular line between the leaf bases of each leaf pair, and the strong similarity of the pistil and the fruits to *Buddleja*, which clearly is related to *Logania*. The more or less irregular nature of the corolla in aestivation, and the reduction of one stamen in *Sanango* decidedly suggest Scrophulariaceae. There is,

<sup>1</sup> In their excellent paper on *Peltanthera*, Hunziker and Fulvio (Bol. Acad. Nac. Ci. Cordoba 40: 217-228. 1957) noted that the genus is known from Costa Rica, Peru, and Bolivia. During the course of this study we have encountered the collection of A. E. Lawrence (no. 432; ca. 100 mi. n.w. of Bogota, depto. Boyaca, Colombia) which clearly represents *P. floribunda* Benth. as circumscribed in that paper. The Colombian specimen agrees in all its floral measurements with those cited by Hunziker and Fulvio for Costa Rican specimens, with the exception of the placentae which seem to extend at least half the length of the ovary as is characteristic of the Bolivian specimen.

<sup>2</sup> The ovary of *Nuxia floribunda* Benth. is deeply two-lobed, which, surrounded by the annular disk, is very suggestive of *Rauwolfia* and other Apocynaceae.

<sup>3</sup> In the African genus *Usteria*, three of the four stamens regularly abort.

however, no tendency toward didynamy of the stamens, as is characteristic of the latter group.

#### AESTIVATION

Aestivation of the flowers of this genus is cochlear, i.e., one corolla lobe is interior, one exterior, and the other three have one edge overlapping and exposed with the opposite edge hidden by the adjacent overlapping lobe (Fig. 1f). The corolla tube is gibbous near the base, and the flower appears to be oriented so that the interior corolla lobe and the gibbous side of the tube are uppermost (adaxial). The vestigial fifth stamen arises on the gibbous side, below one of the two sinuses adjacent to the interior corolla lobe (Fig. 1c). The bud is distinctly zygomorphic, more so than in *Peltanthera*. It is impossible to ascertain from the dried material to what degree the open flower may show this character.

We are unaware of an identical type of aestivation among the other Loganiaceae, though it is not uncommon among the dicots. The usual pattern in five-lobed corollas of this family is with two lobes external, two internal, and one imbricate.

#### VESTURE

At least four types of multicellular hairs occur in *Sanango*. The largest are present on the adaxial face of the basal part of the petiole. These are composed of 3–5 elongate, hyaline cells, the basal one inflated, the terminal one attenuate (Plate IVa). Very young stems and leaves are clothed with hairs of a similar type, a few of which persist on the veins on the lower surface of the mature leaves.

The calyx bears hairs of similar structure, but very much smaller than those described above. In some, however, it appears that the terminal cell is slightly inflated (Plate IVb).

Both surfaces of the corolla are very hairy (Plate IVc). The outside is closely covered by very small, mostly 3-celled attenuate hairs similar in form to those of the leaves, and intermixed with these are some still shorter gland-tipped hairs (Plate IVe). The glandular tip cell is opaque, borne upon a greatly inflated, hyaline basal cell.

The inside of the corolla bears 3–4-celled, gland-tipped hairs about twice as long as those on the outside of the corolla (Plate IVc). [The glandular tip may be composed of several cells arranged radially, but the small size of the structure has prevented us from ascertaining its exact nature. Some lobing is apparent in certain preparations.] In addition, there are many very long, slender hairs in the throat of the corolla that appear to have no cross walls dividing them into cells (Plate IVd).

#### POLLEN

A pollen sample was sent to Dr. G. Erdtman for study. He reports that "the grains are small, uninteresting from a morphological point of view, and similar to those in *Peltanthera* . . ." His diagnosis follows: "Pollen grains small, 3-colporate (about  $15 \times 12.5$ ). Colpi about  $12 \mu$  long. Ora about  $2.5\text{--}3 \mu$  high. Exine thin. Sexine of about the same thickness as nexine. [No pattern or traces of bacula etc. could be seen even by means of an apochromatic objective with the numerical

aperture 1.40. The pollen grains in *Peltanthera costaricensis* are equally 3-colporate and measure about  $15 \times 11 \mu$ ; the exine seems to be very minutely reticulate.]”

#### ANATOMICAL CONSIDERATIONS

Dr. Stern, U. S. National Museum, plans to do a detailed anatomical study of the wood of this genus. We wish, however, to point out that there appears to be no included phloem in this species, which is the typical condition in the Buddlejoidae. This contrasts strongly with the intraxylary phloem present in members of the Loganioidae (Metcalf and Chalk 2:931. 1950). The wood does not appear to differ strikingly from that of *Peltanthera*.

#### EXPLANATION OF PLATE

#### PLATE IV

#### Types of trichomes in *Sanango*

- a. from adaxial face of petiole b. on calyx c. on corolla, exterior (left) and interior (right) [a-c all at same scale] d. enlargement of long hair on interior of corolla, a single short gland-tipped one at its base (note the apparent lobing of the glandular tip) e. enlargement of a single gland-tipped hair on exterior of corolla